

REPRODUCTION IN ORGANISMS

classmate

Date _____
Page _____

* Each & Every organism → live for a certain period of time.

* LIFE SPAN — Period from birth → Natural death.

→ not necessarily correlated with their SIZES

* DEATH of every organism → certainty

* Reproduction maintains continuity of species

* REPRODUCTION → biological process

enables

continuity of the species, generation after generation

→ give rise to young ones (offspring)

→ grow & mature — in turn produce — new offspring

★ Thus, there is a cycle of → birth
→ growth
→ death.

* There is large diversity in biological world.

* Each organism — evolved its own mechanism to multiply & prod. offspring.

★ FACTORS affecting "reproduction"

★ Organism's habitat
★ Internal physiology.

★ BASED ON → Participation of 'one' or 'two' organisms
2 types

ASEXUAL

○ Single parent

○ With or without gamete formation.

SEXUAL

○ 2 parents (opposite sex)

○ Involves fusion of gametes.

1) Elephant — 60-90 yrs

2) Rose — 5-7 yrs

3) Dog — 25-30 yrs

4) Butterfly — 1-2 weeks

5) Crow — 15 years

6) Banana tree — 25 yrs

7) Cow — 20-25 yrs

8) Parrot — 140 years

9) Crocodile — 60 years

10) Horse — 60 yrs

11) Fruit fly — 2 weeks

12) Rice plant — 3-4 months

13) Tortoise — 100-150 years

14) Banyan tree — 200-300 yrs.

ASEXUAL REPRODUCTION

- Identical offspring
 - exact copies of parent
- CLONE - morphologically & genetically similar individuals

* Asexual reproduction common in

- single celled org.
- plants
- animals

with relatively simple organisations.

* Protists
* Monerans

org. / parents divide by mitosis → give rise to new individuals.

in these org. (cell division) itself → mode of reproduction.

* Many single celled org by BINARY FISSION (equal halves)

- Amoeba
- Paramecium

* Budding → unequal, small → buds → prod. that remain attached initially to parent cell

matures ← eventually, gets separated → YEAST

* AMOEBEA under unfavourable cond. → Withdraws its pseudopodia

↓

ENCYSTATION ← this is secretes 3-layer, hard covering / CYST

when favourable cond. return → Encysted amoeba / PSEUDOPODIOSPORES

↓

cyst wall bursts

Spores liberated in surrounding medium

SPORULATION. ← this phenomenon

* Members of FUNGI

↓

SIMPLE PLANTS

↓

ALGAE

① Special reproduce through ② Asexual ③ Reproductive Structures

(asexual)
* PLANTS - Vegetative Propagation

ANIMALS - Asexual Repr.
(used unambiguously)

Units

- Runners → Ginger, Banana
- Rhizome
- Sucker
- tuber → potato
- offset
- bulb → Pistia, Eichornia (water hyacinth)
- Bulbil → Agave
- Leaf buds → Bryophyllum

Veg. propagules → give rise to new offsprings

Asexual reproductive structures



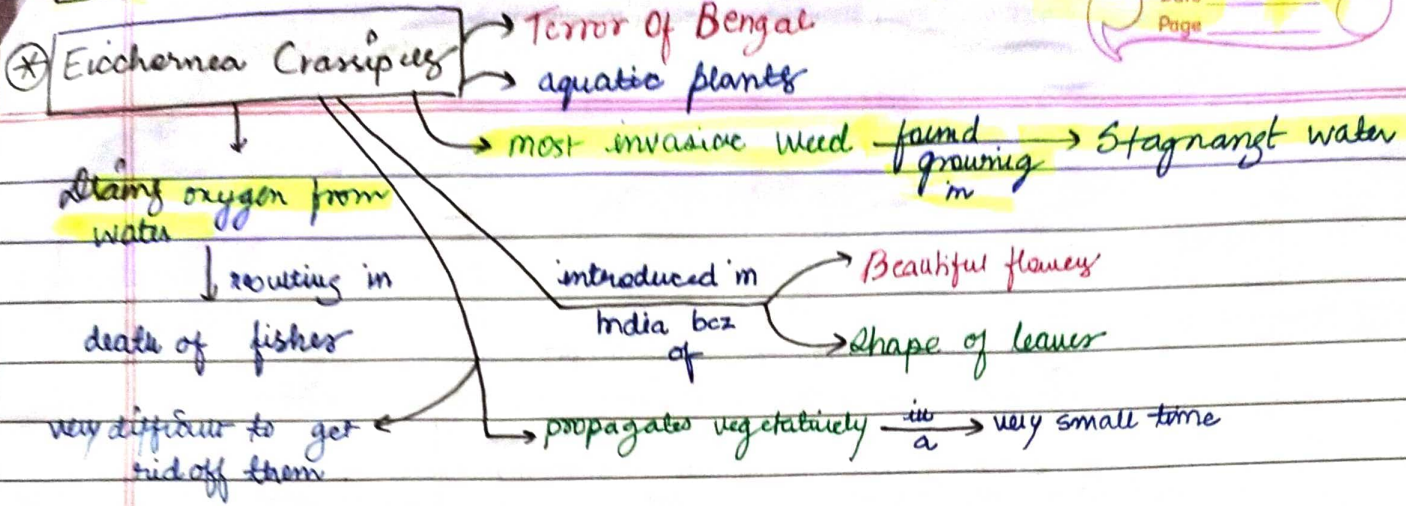
- 1) Chlamydomonas - Zoospores
- 2) Penicillium - Conidia
- 3) Hydra - Budding
- 4) Sponge - Gemmules

Budding — Yeast

Binary fission — Amoeba

TANISHA SACHAN
AIR 1747
NCERT THREAD NOTES

Fragmentation - Hydra (Each fragment - capable of giving offspring) classmate
Date
Page



* Potato tuber - "eyes" → axillary bud

* Banana Rhizome
Ginger Rhizome

* All the new plantlets ^{invariably} arise from **NODES** present in modified stems of these plants.

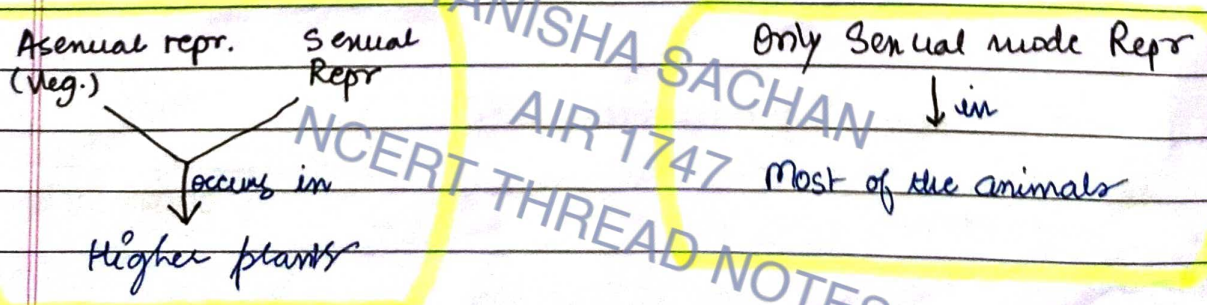
* When nodes come in contact with damp soil / water] they produce new roots / plants

* Adventitious buds arise from notches present at margins of leaves of **BRYOPHYTUM**

* This ability fully exploited by * Gardeners * Farmers } for commercial propagation of such plants

Asexual Reproduction common in organisms with relatively simple organisation like **Algae** and **Fungi**

Onset of unfavourable / adverse condition before Sexual Reproduction they shift to



TANISHA SACHAN
AIR 1747
NCERT THREAD NOTES

Name of organism	Chromosome number in meiocyte (2n)	Chromosome number in gamete (n)
Fruit fly	8	4
House fly	12	6
Onion	16	8
Maize	20	10
Rice	24	12
Apple	34	17
Cat	38	19
Rat	42	21
Human beings	46	23
Potato	48	24
Dog	78	39
Butterfly	380	190
<i>Ophioglossum</i> (an adder's tongue fern)	1260	630

TANISHA SACHAN

AIR 1747

NCERT THREAD NOTES

SEXUAL REPRODUCTION

elaborate
complex
slow process

as compared to Asexual Rep.

① Involves — Formation of ♀ & ♂ gametes — either by
 — Same individual
 — Different individual (of opposite sex)
 these fuse form
 "new organism" — which develops to form Zygote

* New offsprings — not identical to — parents among themselves

① Plants
② Animals
③ Fungi
 differ greatly in — external morphology
 — internal structure
 — Physiology
 but they share — similar pattern in sexual reproduction

JUVENILE PHASE

→ Period of growth

Variable duration
in different-organisms

→ All organisms have to reach

certain growth

certain maturity

before — reproducing sexually

in plants → VEGETATIVE PHASE

* End of Juvenile/Vegetative phase marks the beginning of — Reproductive phase

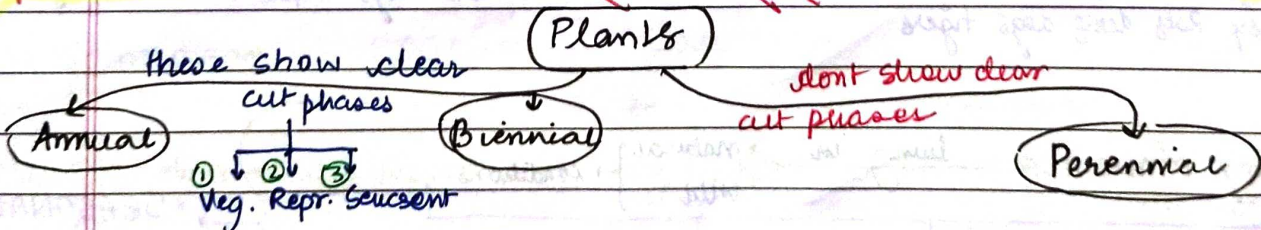
can be easily seen in higher plants when they come to flower.

* Seasonal fruits

Mango

Apple

Jackfruit



Some plants exhibit Unusual flowering

Bamboo

Neelakurinji

Strobilanthus Kuthiana

* Flower only once a life time

50-100 yrs

* Produce large no. of fruits & die

* Flower once 12 yrs

* Flowered in — Sept - Oct 2006

(Sept - Oct 2018)

① Mass flowering of neelakurumbi → Transformed large tracts of Hilly areas into BLUE STRETCHES
 attracts a lot of tourists

in Kerala Karnataka Tamil Nadu

classmate
 Date
 Page

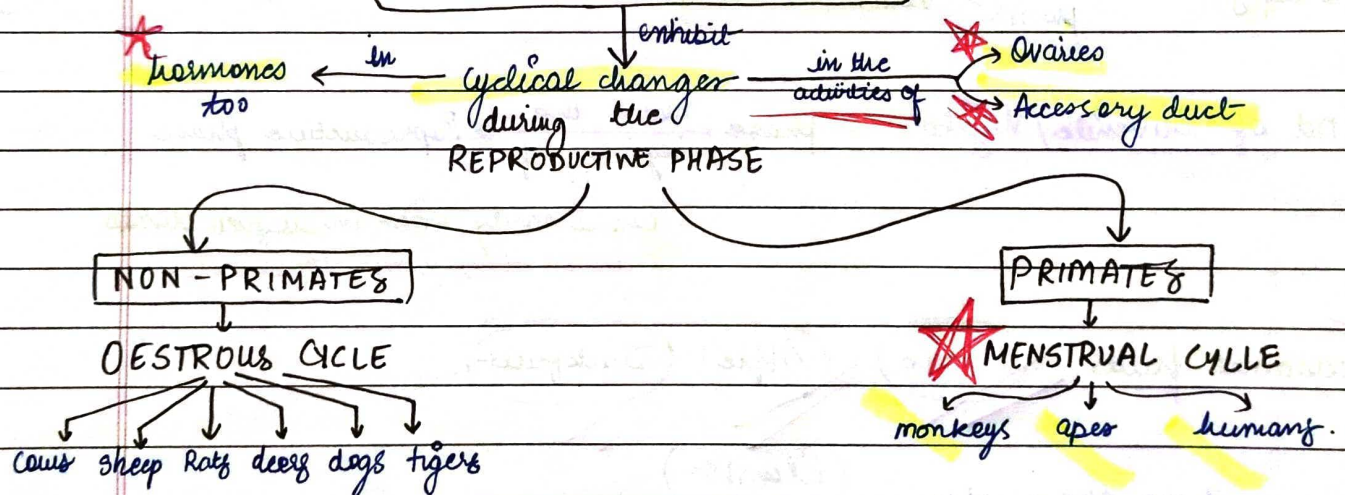
* IN ANIMALS → Juvenile phase followed by Morphological changes and Physiological changes prior to Active reproductive phase

* REPRODUCTIVE PHASE also of variable duration in different organisms.

<p>Birds, living in nature</p> <p>lay eggs seasonally</p>	<p>Birds, in captivity</p> <p>can bc made to lay eggs throughout the year</p> <p>this not reproduction but commercial exploitation of human beings</p>
---	--

NCERT THREAD NOTES

♀ of PLACENTAL MAMMALS



* Many MAMMALS living in natural wild conditions → SEASONAL BREEDERS
 inhibit such cycles only during favourable seasons → in them → reproductive phase

* Many other mammals are reproductively active throughout → Repr. phase → "CONTINUOUS BREEDERS"

* End of Reproductive phase $\xrightarrow{\text{can be considered as}}$ one of the parameters of senescence / old age $\xrightarrow{\text{classmate}}$ $\xrightarrow{\text{DOB}}$ Body $\xrightarrow{\text{During last phase of life span.}}$

There are \rightarrow concomitant changes \downarrow like slowing of metabolism

* Old age $\xrightarrow{\text{ultimately leads to}}$ death.

* In both $\left\{ \begin{array}{l} \text{PLANTS} \\ \text{ANIMALS} \end{array} \right\} \rightarrow$ **HORMONES** $\xrightarrow{\text{are responsible for}}$ transition b/w 3 phases

① Interaction b/w hormones \rightarrow regulates \rightarrow Reproductive processes

② Certain environmental factors \rightarrow Associated behavioural expressions of organisms

(EVENTS IN SEXUAL REPRODUCTION) $\xrightarrow{\text{elaborate complex}}$ Follows a regular sequence.

After attainment of maturity \rightarrow All sexually reproducing org. $\xrightarrow{\text{exhibits}}$ events / processes \rightarrow that have \rightarrow Remarkable FUNDAMENTAL similarity

are $\left\{ \begin{array}{l} \text{very different} \\ \text{structures associated with sexual Reprod.} \end{array} \right\} \xrightarrow{\text{even though}}$

Sexual Rep $\xrightarrow{\text{characterised by}}$ fusion of ϕ & σ^7 gam.

Form. of zygote

Embryogenesis

(PRE - FERTILIZATION EVENTS)

① All events $\xrightarrow{\text{prior to}}$ fusion of gametes.

2 main events

① Gametogenesis

② Gamete transfer.

① **(Gametogenesis)** \rightarrow Process of formation of 2 types of gamete $\rightarrow \phi$ & σ^7

Gametes - haploid. (homogametes)

* In some algae \rightarrow ISOGAMETES \rightarrow Cladophora

$\rightarrow \phi$ & σ^7 gam. Can't be distinguished.

* Majority of sexually reproducing org - HETEROGAMETES \rightarrow 2 morphologically distinct type

• Homo sapiens

• Fucus

antherozoid sperm

egg ovum.

Sexual repr $\xrightarrow{\text{generally involves}}$ fusion of gametes (NOT ALWAYS TRUE |||)

* Plants → Bisexual → ♀ & ♂ repr. structures on same plant / staminate
 → Unisexual → " " " " different plants

* Several FUNGI & Plants → HOMOTHALLIC / Monoecious — Bisexual
 → HETEROTHALLIC / Dioecious — Unisexual

* Unisexual ♂ plant — Staminate

Unisexual ♀ plant — Pistillate

TANISHA SACHAN

AIR 1747

NCERT THREAD NOTES

* BISEXUAL / HERMAPHRODITES



- 1) Earthworm
- 2) Sponge
- 3) Tapeworm.
- 4) Leech.

UNISEXUAL



- 1) Cockroach

* Several Organisms → Monera
 → Fungi
 → Algae
 → Bryophyte } plant body is → haploid

* Pteridophytes
Gymnosperms
Angiosperms
Most animals
Human beings } parental body is → Diploid in these → Specialised cells — MICROCYTES (GMC)
meiosis ← undergoes

* At the end of meiosis — Only 1 set of chromosome gets incorporated into cells. (gametes)

GAMETE TRANSFER

must be brought → physically together to facilitate fertilisation

* In majority of organism — ♀ — non motile gamete / stationary
 ♂ — motile gamete

both gametes } few fungi
motile } Algae

EXCEPTION

Monocious



Cucurbits

Coconuts

Diocious



Papaya

Date palm

TANISHA SACHAN

AIR 1747

NCERT THREAD NOTES

* There is a need $\xrightarrow{\text{for a}}$ medium $\xrightarrow{\text{through which}}$ gametes move

* In several simple plants \rightarrow Algae, Bryophyte, Pteridophyte

WATER is med. \rightarrow through which gamete transfer takes place. (classmate)

* Large no. of male gametes - fail to reach the ϕ gametes

\downarrow hence
no. of σ gametes = X 1000 times of ϕ gametes

* In seed plants, Pollen grains \rightarrow carry \rightarrow male gamete
Ovule \rightarrow has \rightarrow egg

* ~~Eg.~~ of Self fertilizing plants - Peas

(anther & stigma located close to each other)

* For fertilization \rightarrow successful transfer & coming together of gametes imp.

\downarrow
MOST CRUCIAL EVENT
IN SEX. REPR.

TANISHA SACHAN

AIR 1747

FERTILIZATION

NCERT THREAD NOTES

* Most vital event of sex. repr. - fusion of gametes (syngamy) $\xrightarrow[\text{form of}]{\text{results in}}$ Zygote

FERTILIZATION \leftarrow whole process

* Fertilization } often used
Syngamy } though \rightarrow interchangeably

* { PARTHENOGENESIS } - ϕ gamete undergoes development to form a new organism without fertilization.

Rotifers, Honey Bees, Some Lizards, Few Birds (Turkey)

① External Fertilization/Syngamy

- ① majority of algae
- ② fishes
- ③ amphibians

organisms

showing this shows \rightarrow great synchrony b/w \rightarrow sexes

Frogs, Bony fishes

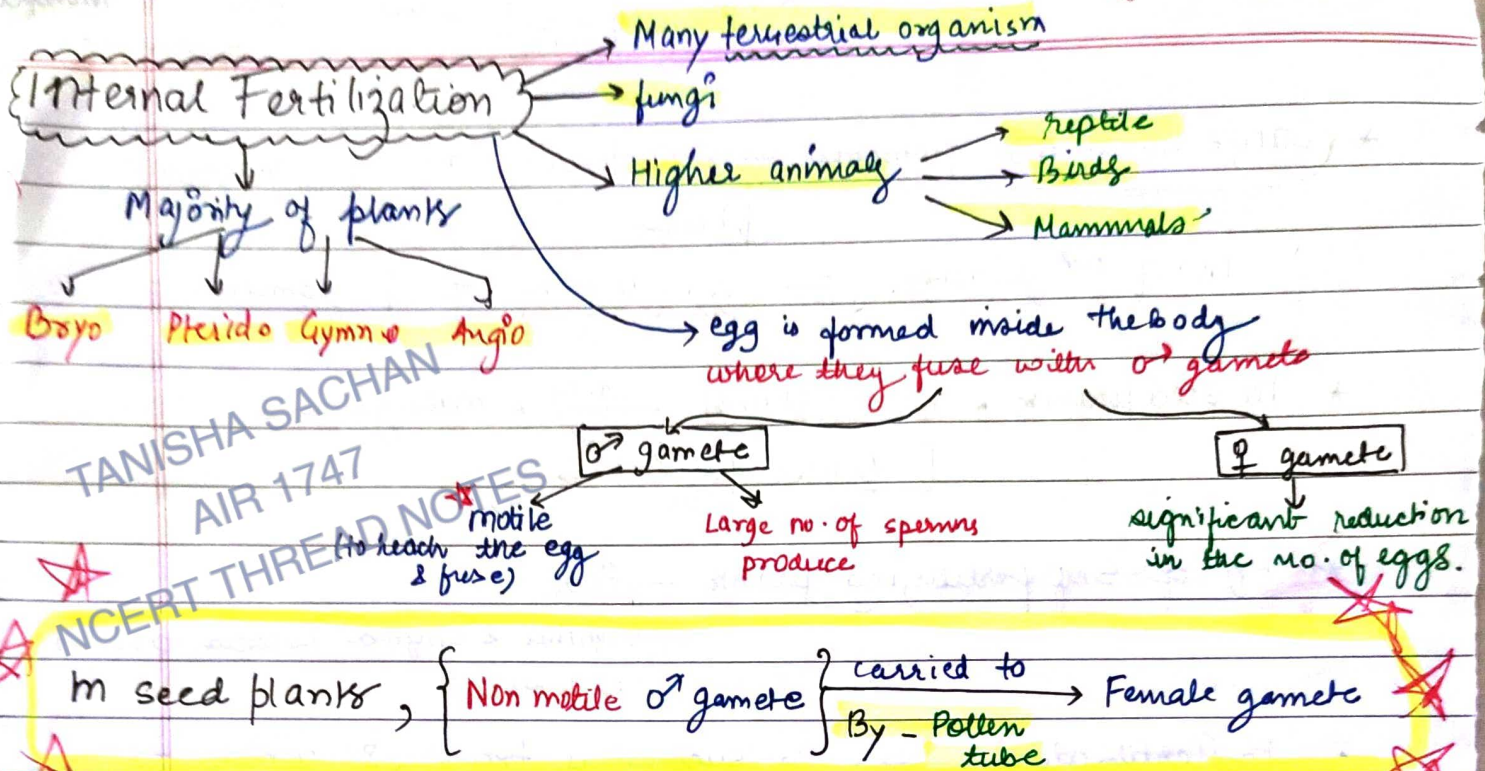
\rightarrow release of large no. of gametes into surrounding medium (water) in order to enhance syn. (water)

Major disadvantage - offsprings are extremely vulnerable to predators threatening their survival upto adulthood.

CLASSMATE

Date

Page



POST FERTILIZATION EVENTS

Events after the form. of Zygote.

ZYGOTE → VITAL LINK that ensures continuity of species b/w org. of one generation & next

Formation of universal in all the sexually reproducing org.

- External fertilizing - Zygote formed in ext. medium (water)
- Internal fertilizing - " " inside body of org.

Further development of Zygote depends on

- Type of life cycle
- environment - org. is exposed to

- * In FUNGI & ALGAE
 - Zygote develops a thick wall that is resistant of dessication → damage
 - It undergoes a period of Rest before germination.

* Every sexually reproducing organism including HUMAN BEING starts life as Single cell Zygote

EMBRYOGENESIS

refers to process of development of embryo from zygote

during it Zygote undergoes

- cell division (mitosis)
- Cell differentiation

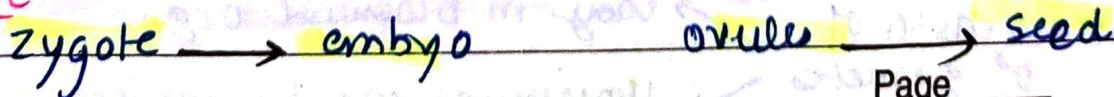
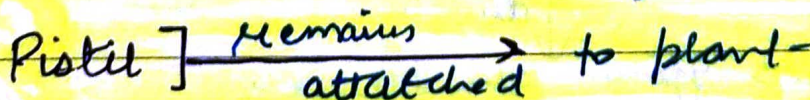
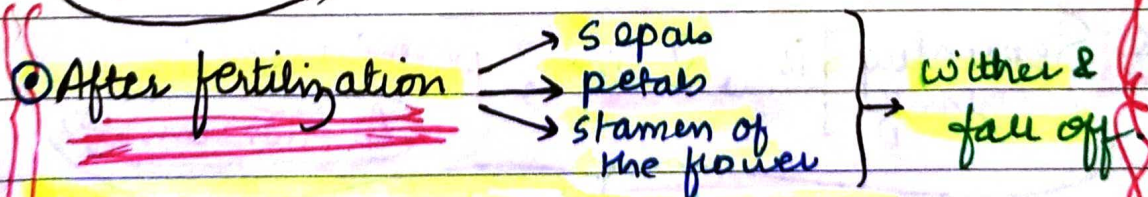
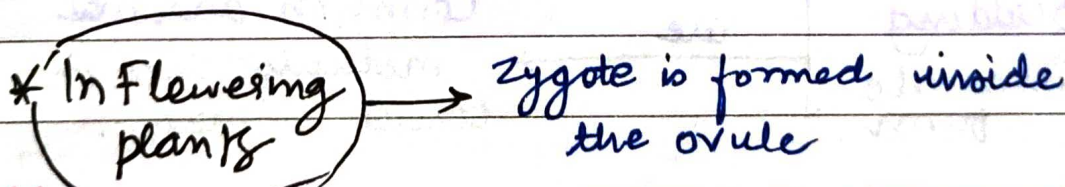
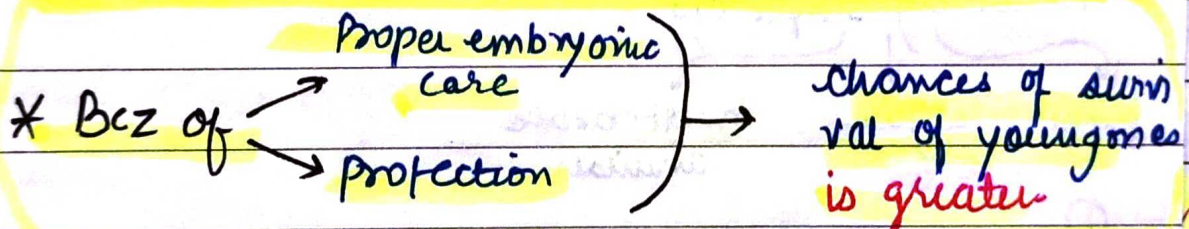
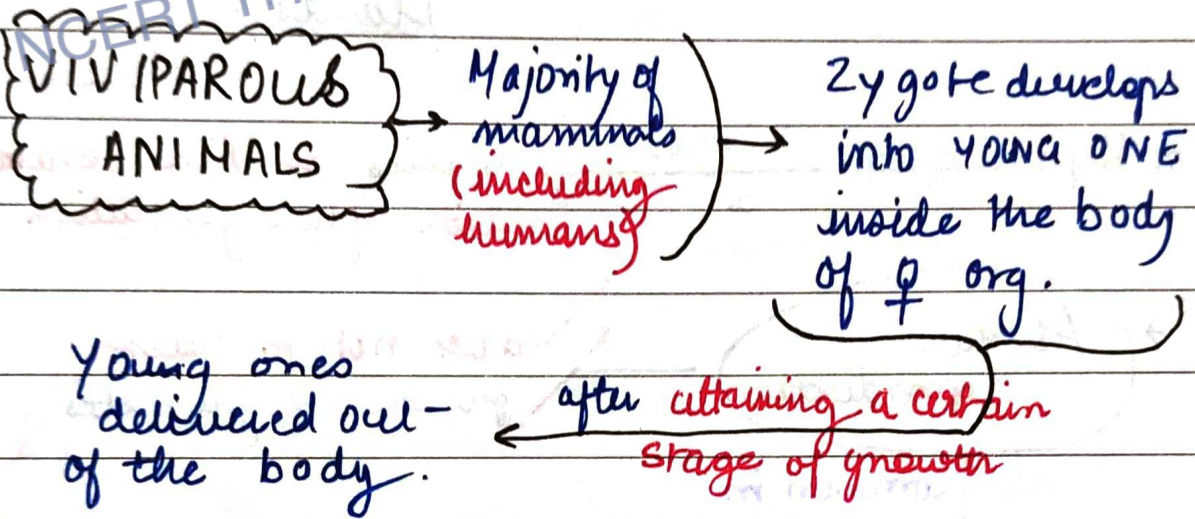
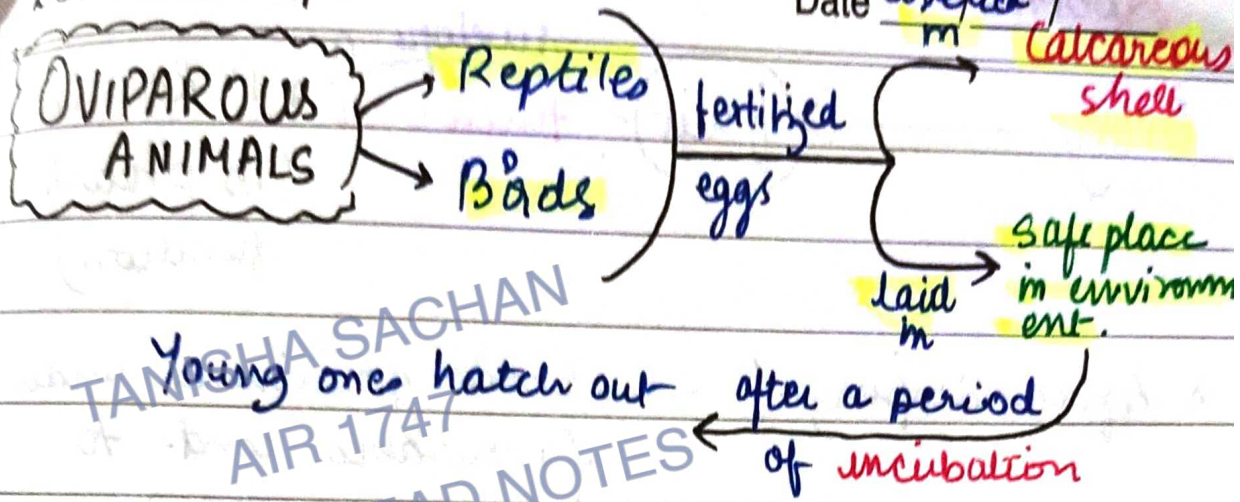
Cell division → increases no. of cells in the developing embryo

Cell differentiation → helps grp of cells to undergo certain modification to form specialised tissue → organs → organism

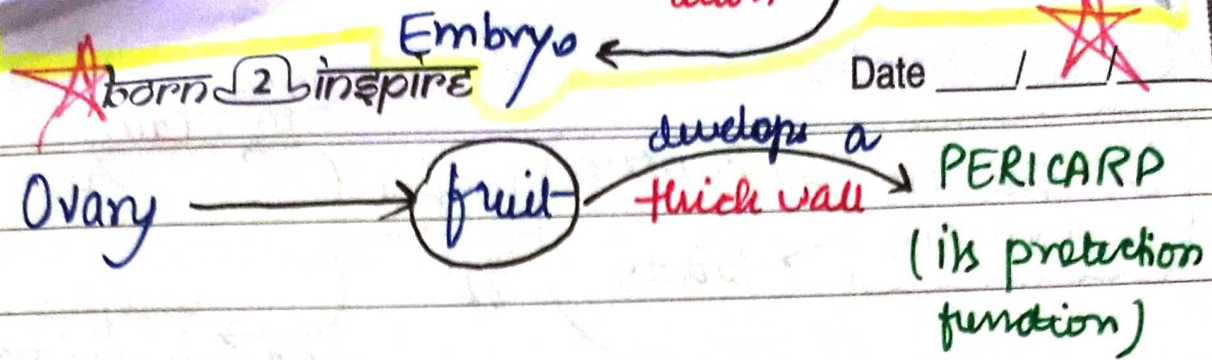
* Whether development of Zygote takes place outside the body or inside the body (female parent)

Lay fertilized / unfertilized eggs → OVIPAROUS → give birth to young ones → VIVIPAROUS

born 2 inspire



inside mature seed is Progenitor of next generation



* After dispersal → seeds germinate under favourable cond. to produce new plants.

* Reproduction enables a species to live generation after generation

* Asexual Reproduction → does not involve fusion of gametes

common in
Relatively simple org.
fungi algae invertebrate animals

① Budding
② Gemmule form
are common asexual methods seen in lower animals.

* Sexuality in plants is varied, particularly in Angiosperms

due to
Prod. of diverse types of flowers.

* Transfer of ♂ gametes → easy in bisexual org.
→ unisexual mc by copulation of simultaneous release.